Tell Me How to Do This Thing Called Design!
Practical Application of Complexity Theory to Military Operations

by Grant Martin

Since first being introduced to "Design" I, like many others, have felt that there was an awful lot of theory and not enough practical application. Naturally, therefore, I feel sympathetic towards those who clamor for less background theory and more operational "how to" instructions. We are an Army of action, and there is little room, patience, or cultural tradition for too much time thinking about things. And, honestly, too much time hesitating, thinking, or theorizing many times will cede the initiative to those who act boldly. "'Okay", you say: "I'll trust your theory (or I'm just not interested in all that mumbo-jumbo), just give me what to do!!" If that quote is something that resonates with you, then this article was written with you in mind.

Before I get into some possible practical application, I do, however, urge everyone to read more about the theoretic underpinnings of the Design (or complexity theory) literature and get very familiar with how other disciplines are struggling in their own lanes to address complexity (instead of architecture- the basis for much of "Design"- however, I'd encourage military thinkers to delve into how economics, information theory and computer science, psychology, sociology, evolutionary biology, physics (quantum mechanics) and cosmology are incorporating complexity theory into their own areas of study).

A cursory study of how economics, for instance, is tackling complexity would show that although businessmen have long been innovative, used creative and critical thinking, and done "Design"-like activities, a truly informed and discipline-wide approach to complexity has never really been undertaken. This is fine if we want to keep on doing what we've always done and mainly address symptoms instead of root causes. Hopefully, however, there is a critical mass of humans who would like to progress past the current status quo with respect to trying to solve problems.

Luckily, prior to studying complexity theory and the like I read an economics book by Eric Beinhocker (*The Origin of Wealth*) that attempted to explain the basics of complexity theory and then offered a model for building successful businesses (he assumed the world is an adaptive complex system and that the only way to be consistently successful is to learn how to thrive in complex environments). His main thesis was that evolutionary biology offered a very successful and real example of how to thrive in a complex environment. In short, nature runs a tremendous amount of different experiments without centralized control, selects those that are successful, and then pours resources into those successful "experiments". This "Differentiation, Selection, Amplification" process offers no less than an operational way of using evolutionary processes to be successful in a complex environment- and, indeed, other systems besides nature show this evolutionary process as well (the financial, stock, bond, and business markets, for instance). The solution is to understand this process and take advantage of the natural advantages it offers.

Report Documentation Page		*Form Approved* *OMB No. 0704-0188*

Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

1. REPORT DATE **08 APR 2011**	2. REPORT TYPE	3. DATES COVERED **00-00-2011 to 00-00-2011**
4. TITLE AND SUBTITLE **Tell Me How to Do This Thing Called Design! Practical Application of Complexity Theory to Military Operations**		5a. CONTRACT NUMBER
		5b. GRANT NUMBER
		5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)		5d. PROJECT NUMBER
		5e. TASK NUMBER
		5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **U.S. Army JFK Special Warfare Center and School (Airborne),Fort Bragg,NC,28310**		8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)		10. SPONSOR/MONITOR'S ACRONYM(S)
		11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT **Approved for public release; distribution unlimited**

13. SUPPLEMENTARY NOTES

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT **Same as Report (SAR)**	18. NUMBER OF PAGES **6**	19a. NAME OF RESPONSIBLE PERSON
a. REPORT **unclassified**	b. ABSTRACT **unclassified**	c. THIS PAGE **unclassified**			

Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std Z39-18

There are other suggestions Beinhocker has for businesses, and they run the gamut from strategy on down. I will touch on a few of them here and attempt to apply the ideas to the military. I ask Mr. Beinhocker's forgiveness for borrowing his ideas yet <u>again</u>, but as both economics and the military deal with the behavior of people and companies look more like Army units than buildings do, I think this is a much more valuable exercise than reading much of the doctrine on Design (owing to its heavy architectural underpinnings).

In the end, I will attempt to make the case that the military should turn to evolutionary biology for clues on how to run operations, turning away from strategy as it is a farcical concept for the same reasons Beinhocker says businesses should get away from it. I will also recommend that we instill in our military units and institutions the requirement to constantly change culture, structure, and processes- as that is the only way in which we can use evolutionary processes to be successful.

What Beinhocker suggests for companies

Eric Beinhocker, a McKinsey and Company associate, makes <u>these points</u> about how businesses and governments should address complexity:

On Strategy

Evolutionary theorists have a saying that "evolution is cleverer than you are"—rather than trying to out-guess and out-predict economic evolution, business leaders should seek to harness evolution's power to innovate.

Managers should abandon strategic planning processes that rely on predicting the future and instead "create portfolios of strategic experiments" that are robust against a range of possible outcomes.

Creating such portfolios requires companies to develop processes for encouraging strategic variety within their businesses, using market feedback to select promising experiments, and then rapidly channeling resources to scale up experiments that succeed.

On Organization

In constantly changing markets, competitive advantage is short-lived and most companies have a difficult time refreshing their sources of advantage —research shows that just five percent of companies are able to sustain superior performance for ten years or more.

Significant barriers exist within firms that prevent the evolutionary processes of variation, selection, and amplification from working as well inside companies as they do outside in the marketplace—this means that companies are less adaptive than the markets they compete in.

Managers need to change company structures, processes, and in particular culture, to break these barriers down and get the wheels of evolution spinning inside their companies as effectively as they spin in the marketplace.

Financial markets are themselves evolutionary systems—they are continuously evolving ecosystems of investor strategies and expectations.

Understanding the evolutionary workings of stock markets helps explain what really drives stock prices, and why market volatility is greater than traditional theory predicts.

This evolutionary view claims that the connection between stock price and the fundamental economic value of a company is looser than previously thought—this has implications not just for investors, but also for shareholder governance, the role of stock options in executive compensation, and how the performance of companies is measured.

On Politics and Policy

Historically, the right has viewed government as the problem and the left has viewed it as the solution—from an evolutionary perspective, neither is correct.

Governments play a vital role in enabling economic evolution, and therefore wealth creation, to occur—weak government institutions can stop economic evolution in its tracks, as seen in many developing countries.

Governments provide a framework for economic evolution to operate in, and can also play a legitimate role in shaping the "fitness function" of the evolutionary environment toward social ends—for example in environmental policy—but should avoid selecting winners and losers in the competition between business designs.

Although I have skipped all of the underlying logic and theory behind why Beinhocker believes businesses should go to an evolutionary-type model, I again encourage military thinkers to investigate the latest on complexity theory and why evolutionary forces are so successful. If the underlying logic is something we can all agree upon, then we can begin to discuss ways in which to address complexity. If, however, we continue to posit that "the world has always been complex", that "we've always done Design", or "just tell me what (or how) to do it", then I think we are still arguing over the underlying logic and it is almost useless to recommend practical applications.

How Beinhocker's ideas could be applied to the military

I do recommend that if you do not agree with the following assumptions, you can probably stop reading now:

 ➢ That complexity is and has been the norm for most human interaction
 ➢ That attempting to be successful in a complex environment takes more than past experience in similar situations, must take into account context, and requires constant learning of the environment and adjustment from that learning to include knowledge and definition of "self" (as "self" is part of the environment) and the shared experience and perspective of others
 ➢ That biological evolution offers one example of a successful approach to complexity
 ➢ That evolutionary forces are successful due to a "Differentiation, Selection, Amplification" process
 ➢ That the military has never "done Design", if that means taking an informed approach to operating in a complex environment

> ➤ That "the world" grows increasingly more complex using any of the varied ways scientists measure growth in complexity including information, entropy, quantum behavior, and cosmological progress

In short I assume the above and therefore my recommendations could be flawed if they are wrong or, if anyone disagrees with them then they probably won't agree with my practical recommendations.

On Strategy

Military leaders should do the same thing Beinhocker recommends businessmen stop doing: strategic planning processes that attempt to predict the future. This means using MDMP for any kind of complex undertaking (or, more preferably phrased: "in any kind of complex environment") would be a waste of time. MDMP requires an end-state, a plan not easily adjusted, an over-reliance on assumptions, and reverse, linear-type planning methods. Even doctrinal Design methodologies require a guestimate as to what systems will do in the future "if not acted upon, if they are "more desired", or if they fall into the realm of the "system of opposition".

Instead, as Beinhocker recommends for companies, military units should create "portfolios of strategic experiments" that are "robust against a range of possible outcomes". What this means in military-speak is that in a complex environment, a battalion commander, for example, goes ahead and assumes he knows very little about this environment and goes about tasking, empowering, and supporting companies and other subordinate units to go about the environment conducting experiments. This could simply be gathering information, it could be acting "on the system" and then observing the system's response, or it could be something else.

The main function of higher headquarters would be to develop processes that would encourage a variety of action and figuring out how to gather feedback in order to choose the most promising "experiments". Those processes would have to very quickly channel resources into supporting those successful "experiments".

Consider, for example, a battalion newly-arrived in an area that is beset by insurgency. The battalion commander asks his company commanders to observe their areas and then report back concepts that will theoretically improve things on the ground in a sustainable manner. The battalion staff then prioritizes the battalion's limited resources to support the various concepts of the company commanders'. To those company commanders who are successful, the battalion gives them more assets and attempts to copy their success in other areas if it is applicable. Over time the battalion will gain knowledge of the environment it is operating in, should be sourcing more and more successful strategies, and should be able to provide higher headquarters with suggestions on future operations.

Of course not every "experiment" will be transferrable and this implies a long-term presence. But, if one concludes that success in a complex environment entails a long-term presence and "one step back for every two steps forward", then policy makers can plan for such and be dissuaded by military advisers if they are unwilling to devote the necessary will to the task. Indeed, true efforts in complex environments will have to be tied very directly and clearly to national security since sustainable success in complex environments implies the possibility of a large cost.

In complex environments, advantage does not last and most military units will find it hard sustaining their advantage. This is because the environment will change (and oftentimes "the enemy" as well) more rapidly than the military historically has adapted. To combat this the military must change the structures of their task forces, internal processes, and even military culture in order to encourage the adaptation needed. This is solely required to pave the way for the evolutionary models described above. Without this wholesale "re-inventing" of ones' organization, the flexibility, independence, and "bottom-up-ness" required under the evolutionary model will never see the light of day. Only one thing will be important in a system like this: results. Anyone familiar with the politics internal to units, headquarters, and military efforts (not to mention inter-governmental actions) should see how the change Beinhocker recommends here to businesses will break many a "rice-bowl" if attempted.

This change has to enable an organization to adapt quicker than competitors. If adapting means taking years to field a "Mine-Resistant-Ambush-Protected" vehicle to withstand IEDs, then I'd posit that we must redefine what "adapting" means. Most adaptation should be in how we execute processes and organize ourselves. A heavy reliance on technological solutions and materiel up-grades implies a lack of inherent adaptability.

At the extreme, military task-forces will cease to be easily-identified as such. Instead, every complex situation will require a different type (though many will look similar, especially at the beginning prior to gaining knowledge) of "task-force" and that task force could have very small pieces of the military (think PRTs, HTTs, etc.). Individuals and units would deploy to an area and be ready to constantly adapt and restructure themselves as headquarters adjust to the environment and the changes inherent over time. Local nationals, State Department personnel, other governmental agency folks, and others would make up important parts of these task forces and military forces would be able to take-on non-traditional functions. Think of semi-independent teams of learning organizations, elite in terms of being highly-adaptable and effective (results-oriented), and informing higher headquarters of valuable insights into what is happening on the ground, what they recommend as to "ways ahead", and able to change the ruling paradigms of the conventional wisdom.

The trust required by higher headquarters' in their subordinates in this type of environment will not be just an objective or something we talk about, but something that is paramount for success. A personnel system that punishes toxic leaders and micro-managers would be required. The military's fear of subordinates evaluating superiors will have to be gotten over. And calculated risk-takers and innovators will have to not only be rewarded, but encouraged and promoted to the top.

Testing of these task forces at training centers would be akin to Crossfit Coach's "hopper" The concept is simple, if not profound at the same time: different missions or tasks would be put into a hopper, the hopper turned, and several would be pulled out. Those would be the ones the unit would have to execute. In this way the best units would be those that are proficient at the basics but can adjust to whatever scenario they face.

Further thinking required

This is an admittedly economics and "Learning Organization" (as defined by Senge) - heavy solution set. Although Beinhocker did include many other disciplines in his research,

there are probably other solution sets developed by other disciplines (or as-yet undeveloped) that would be more applicable to the environment the military faces. In addition, there has to be a clearer concept as to how to incorporate complexity theory fundamentals into Major Combat Operations. Although the average Army unit would get away from specialization, there would still be the requirement to have some specialization in certain units and for certain missions (think artillery, logistics, and counter-terror units). Lastly, the hard work of actually incorporating these needed changes into detailed plans will take a Herculean effort.

Conclusion

The reason we must transform to better address complexity is that for too long now we have developed a highly-capable and technologically-savvy force that can perform wonders when confronted with short-term, limited, and kinetic objectives. We fight symptoms of greater issues well: we are like a Super-nose spray. But, when confronted with root causes we are not as successful. We can no longer afford to offer our nation a template that only secures kinetic objectives or a way of conducting stability operations that contributes to bankrupting the nation or upsets higher-priority domestic agendas.

The solution isn't a choice between competing planning concepts. The world (universe) is complex and growing more so according to objective measurements regardless of intuitive thinking making one believe everything is the same as it always has been. Enabling teams of hyper-adaptive innovator-problem solvers that take advantage of proven techniques (evolution) to address complex environments is one way we might be able to apply the concepts behind "Design" to the way we conduct operations. Instead of planning, headquarters and staff work would busy themselves enabling those teams to inform leaders of what the environment they are facing entails, prioritizing resources, and figuring out how to resource all the teams while rewarding the ideas of the successful teams.

Grant Martin is a U.S. Army Special Forces Major assigned to the U.S. Army JFK Special Warfare Center and School (Airborne).